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Shinji Kajita

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EXAMINER

WATSON, JOY L

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/585,482	Applicant(s) KAJITA ET AL.	
	Examiner JOY WATSON	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-5,7-25 and 27-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3-5, 7-25,27-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 July 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10 July 2006</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to because copy submitted is two pages long and contains a picture. Correction is required. See MPEP § 608.01(b). Applicant is reminded of the proper content of an abstract of the disclosure.

A patent abstract is a concise statement of the technical disclosure of the patent and should include that which is new in the art to which the invention pertains. If the patent is of a basic nature, the entire technical disclosure may be new in the art, and the abstract should be directed to the entire disclosure. If the patent is in the nature of an improvement in an old apparatus, process, product, or composition, the abstract should include the technical disclosure of the improvement. In certain patents, particularly those for compounds and compositions, wherein the process for making and/or the use thereof are not obvious, the abstract should set forth a process for making and/or use thereof. If the new technical disclosure involves modifications or alternatives, the abstract should mention by way of example the preferred modification or alternative.

The abstract should not refer to purported merits or speculative applications of the invention and should not compare the invention with the prior art.

Where applicable, the abstract should include the following:

- (1) if a machine or apparatus, its organization and operation;
- (2) if an article, its method of making;
- (3) if a chemical compound, its identity and use;
- (4) if a mixture, its ingredients;
- (5) if a process, the steps.

Extensive mechanical and design details of apparatus should not be given.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1, 5 and 23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. Claim 1: It is unclear if the driving device and the substrate holding mechanism move at the same speed or if their speeds are directly correlated to each other. For purposes of examination the speeds are directly correlated to each other.

b. Claim 5: It is unclear where and when the liquid is discharged from the liquid discharging mechanism. For purposes of examination the liquid is discharge into the wafer cleaning chamber during the cleaning process.

c. Claim 23: It is unclear as to what liquid is being switched (line 9 and 10) to supply from the first liquid supply nozzle. Is the liquid the cleaning liquid, treatment liquid or a different liquid? Clarification is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 9-13, 15-21, 23-25, 31-35 are rejected under 35 U.S.C. 102(b) as being anticipated by Verhaverbeke (US PG Pub 2002/0066475 known hereafter as '475)

Claim 1, 9, 17 and 31

'475 teaches a substrate holding mechanism (310) which holds the substrate under a force which changes with the change in the rotational speed of the substrate holding mechanism (paragraph 32). The rotational speed of the substrate holding mechanism is changed by a motor attached to the chuck (122 and 148, paragraph 36) while treatment liquid supply mechanism (122 and 124) supplies cleaning and treatment liquid (DI water) to the substrate (paragraph 25, 27 and 36). '475 additionally teaches that the motor (122) which rotates the substrate holding mechanism relative to a rotation speed of the substrate (paragraph 36).

Claim 10

'475 teaches the method according to Claim 9 where it is inherent by increasing or decreasing the rotational speed of the substrate holding mechanism the rotational speed of the substrate will change relative to the rotational speed of the substrate holding mechanism.

Art Unit: 1792

Claim 11 and 12

'475 teaches the method according to Claim 9 and teaches changing the rotational speed of the substrate from a first rotational speed (rpm=0 before the cleaning process commences) (paragraph 31) then changing the rotational speed to a second speed (rpm=3000-6000) (paragraph 36) and returning to the first rotational speed (rpm=0 for removal of the wafer) (paragraph 31). The supply of treatment liquid is stopped after the rotational speed is increased from the first rotational speed (rpm=0) to the second rotational speed (rpm=300-6000) (paragraph 27).

Claim 13 and 20

'475 teaches a substrate processing method where the substrates is held by a substrate holding mechanism and the substrate holding mechanism rotates the substrate. '475 also teaches rotating the substrate during and after supplying treatment liquid (NH₄OH) followed by the additional step of rotating the substrate while supplying the cleaning liquid (DI water) which removes the treatment liquid and a chemical liquid (H₂O₂) and will cover a surface of the substrate with a cleaning liquid (paragraph 27).

Claim 15

'475 teaches the method according to claim 13 and additionally teaches rotating the substrate at a second high speed for to remove the cleaning liquid and dry the substrate (paragraphs 27 and 36)

Art Unit: 1792

Claim 16

'475 teaches the method according to claim 15 and suggests that the first and second high speed are substantially equal (paragraph 36).

Claim 18

'475 teaches the method according to Claim 17 and additionally teaches rotating the wafer at 10-100 rpm during the cleaning cycle (paragraph 25 and 36).

Claim 19 and 32

'475 teaches a substrate processing method where the substrates is held by a substrate holding mechanism and the substrate holding mechanism rotates the substrate. '475 also teaches rotating the substrate during and after supplying treatment liquid (NH_4OH) followed by the additional step of rotating the substrate while supplying the cleaning liquid (DI water) which removes the treatment liquid and a chemical liquid (H_2O_2) and will cover a surface of the substrate with a cleaning liquid (paragraph 27). '475 additionally teaches rotating the substrate at a second high speed for to remove the cleaning liquid and dry the substrate (paragraphs 27 and 36) and teaches that the first and second high speed are substantially equal (paragraph 36).

Claim 35

'475 teaches the method according to claim 19 and additionally teaches that the liquid is supplied to completely coat and clean the substrate (paragraph 37).

Claims 21, 33 and 34

'475 teaches the method according to claim 9 and additionally teaches that the liquid is supplied to completely coat and clean the substrate (paragraph 37).

Claims 23-25

'475 teaches holding a substrate with a substrate holding mechanism, rotating the substrate with a by a substrate rotation mechanism. A first nozzle (151) supplies a treatment liquid (124) to the substrate, then the cleaning liquid (125) is supplied through the first nozzle (151) where is cleans the first liquid supply nozzle and the vicinity of the first liquid supply nozzle and then the flow of the cleaning liquid is stopped in order to dry the substrate by rotating it and to purge the liquid cleaning line with an inert gas (paragraphs 37, 36 and 37). '475 teaches supplying a cleaning liquid to a second liquid supply nozzle (142) which cleans the inner surface of the substrate holding mechanism and upper surface of a base member (paragraphs 24, 25 and 38). '475 further teaches supplying a gas from a gas supply nozzle (142) to a space between the substrate and a base member having the substrate holding mechanism attached thereon during said drying of the substrate (paragraph 39). During the drying cycle a gas is supplied to the gas supply nozzle while the said cleaning of the first liquid supply nozzle and its vicinity (paragraph 39).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Art Unit: 1792

9. Claims 3-5, 7, 14 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over '475.

Claim 3

'475 teaches a substrate holding mechanism which holds the peripheral portion of the substrate (210) attached to a base member (148, 248). The base member faces one surface of the substrate (106). A rotatable shaft (242) attached to the central portion of the base member (248). The substrate processing apparatus has a first and second liquid supply nozzle (151 and 142 respectively, paragraphs 37 and 38). The first supply nozzle supplies a chemical liquid or a first cleaning liquid (123 and 124, paragraph 25) and the second supply nozzle supplies a second cleaning liquid (112) to the inner surface of said substrate holding mechanism and upper surface of said base member (paragraph 24). The apparatus also comprises of a gas supply nozzle (paragraph 39) which supplies gas between the substrate and said base member. '475 additionally teaches a purge gas (N_2 , paragraph 39) which supplies purge gas between said rotatable shaft and said nozzle structure. '475 implicitly teaches a switching device during use of the RCA cleaning chemistry which switches the chemical liquid to the first cleaning liquid in the first nozzle (paragraph 27). '475 does teach that the second nozzle and the gas supply nozzle is disposed within the rotatable shaft, but does not teach that the first liquid supply nozzle is within the rotatable shaft. Without evidence of unexpected results, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have the first liquid supply nozzle within the

Art Unit: 1792

rotatable shaft, since it has been held that forming in one piece an article which has formerly been formed in two pieces and put together involves only routine skill in the art. *Howard v. Detroit Stove Works*, 150 U.S. 164 (1893).

Claim 4

'475 suggests the apparatus of claim 3 where the first liquid supply nozzle is capable of cleaning the first liquid supply nozzle, an outer surface of said nozzle structure and the vicinity thereof with the first cleaning liquid. However, it is fundamental that an apparatus claim defines the structure of the invention and not how the structure is used in a process, or what materials the structure houses in carrying out the process. *Ex parte Masham*, 2 USPQ2d 1647, 1648 (BPAI 1987). See also *In re Yanush*, 477 F.2d 958, 959, 177 USPQ 705,706 (CCPA 1973); *In re Finsterwalder*, 436 F.2d 1028, 1032, 168 USPQ 530, 534 (CCPA 1971); *In re Casey*, 370 F.2d 576, 580, 152 USPQ 235,238 (CCPA 1967). As long as the apparatus of '475 is capable of being configured to perform the functions as described in applicants claims, the prior art apparatus meet the requirements of the claimed feature. Applicant has not established on this record any structural distinction between apparatus within the scope of the rejected claims and the apparatus fairly described by '475, and no such structural distinction is apparent.

Claim 5

'475 suggests the apparatus of claim 3 and a first line (noted on the far left hand side of Fig. 1A) connected to the first supply nozzle, a second line (noted as 128, Fig. 1A,

Art Unit: 1792

paragraph 36). The liquid discharging mechanism is inherently taught because the liquid is discharged from the first and second line into to the wafer cleaning chamber (paragraph 25).

Claim 7

'475 suggests the apparatus of claim 3 and additionally teaches supplying a third cleaning liquid to the substrate by a nozzle (Fig. 1A and paragraph 27, from nozzles 151). '475 does not teach that the third cleaning liquid is supplied by a third nozzle. Without evidence of unexpected results it would have been obvious to one of ordinary skill in the art at the time of the invention to use two separate nozzles for the two cleaning liquids instead of one nozzle that supplies two liquids, since it has been held that constructing a formerly integral structure in various elements involves only routine skill in the art for the predictable results of having a substrate processing apparatus.

Nerwin v. Erlichman, 168 USPQ 177,179.

Claim 14

'475 suggests the method according to claim 13, but does not teach the first high rotational speed is between 1000-3000 rpm. '475 does teach that the rotational speed of the wafer during the cleaning liquid is between 3000-6000 rpm (paragraph 36). It would have been obvious to a person having ordinary skill in the art at the time the invention was made to determine the optimum rotational speed, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering

Art Unit: 1792

the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 105 USPQ 223 (CCPA 1955).

Claim 27

'475 teaches the method of claim 23 and teaches that gas is supplied to the space between the substrate and the base member and that cleaning liquid is supplied to the first liquid supply nozzle and the vicinity thereof, but does not teach that the gas is supplied to the space between the substrate and the base member during said cleaning of the first liquid supply nozzle and its vicinity. Without evidence of unexpected results it would have been obvious to one of ordinary skill in the art at the time of the invention to have the two processes occur simultaneously for the predictable results of processing a substrate, since it has been held that the selection of any order of performing process steps is prima facie case of obvious in the absence of new or unexpected results. *Ex parte Rubin*, 128 USPQ 440 (Bd. App. 1959) See also *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946)

Art Unit: 1792

10. Claims 8 and 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over '475 as applied to claim 1 above, and further in view of Rodney Chiu et al. (US PG Pub 2003/0183250 known hereafter as '250)

Claims 8, 28-30

'475 teaches the apparatus according to claim 1, but does not teach or suggest a scatter prevention cup disposed outside of said substrate holding mechanism and being movable in a vertical direction. '250 teaches a scatter prevention cup which translates in a vertical direction (paragraph 37 and 59, Fig. 6 step 610) to prevent fluid flow from scattering. All of the component parts are known in '475 and '250. The only difference is the combination of the "old elements" into a single device. Thus, without evidence of unexpected results it would have been obvious to one of ordinary skill in the art to have a scatter prevention cup as taught by '250 on the outside of the substrate holding mechanism of '475, since the operation of the scatter prevention cup is not dependent on the operation of the substrate holding mechanism to achieve the predictable result of preventing fluid from scattering on the interior of the apparatus.

Art Unit: 1792

11. Claim 22 rejected under 35 U.S.C. 103(a) as being unpatentable over '475 as applied to claim 21 above, as evidenced by Yamamoto et al. (US Patent 5,898,720 known hereafter as '720).

Claim 22

'475 teaches the method according to Claim 21, but does not teach or suggest what the film comprises. The examiner takes official notice that copper is a common impurity in layers of semiconductors as evidenced by '720 (col. 6 lines 35-40). Thus, without evidence of unexpected results, a person of ordinary skill in the art to try the method of processing the semiconductor as taught by '475 that has the impurities of '720, as a person with ordinary skill has good reason to pursue the known options within his or her technical grasp. In turn, because the processing method for removing impurities is predicted by prior art, it would have been obvious to use the method to process the substrate.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOY WATSON whose telephone number is (571)270-1267. The examiner can normally be reached on 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone

Art Unit: 1792

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Joseph L. Perrin/
Joseph L. Perrin, Ph.D.
Primary Examiner
Art Unit 1792

JLW